

## Crayfishes (Class Malacostraca) Overview

The freshwater crayfishes (Order Decapoda) are one of the better known crustacean groups in Kentucky. Worldwide, freshwater crayfishes are represented by over 640 species (Crandall and Buhay 2008) with the southeastern United States being one of the epicenters of diversity. Three hundred sixty species are represented in the United States (Taylor *et al.* 2007). All of Kentucky's crayfish fauna falls into the family Cambaridae and is represented by the genera *Barbicambarus*, *Cambarus*, *Cambarellus*, *Fallicambarus*, *Orconectes*, and *Procambarus*. Kentucky is home to one of the richer freshwater crayfish faunas in North America with 54 species, with some of those species still under taxonomic review and others potentially awaiting discovery. Seven species are endemic to the state of Kentucky (*Cambarus batchi* – Bluegrass Crayfish, *Orconectes margorectus* – Livingston Crayfish, *Orconectes bisectus* – Crittenden Crayfish, *Orconectes jeffersoni* – Louisville Crayfish, *Orconectes rafinesquei* – Rough River Crayfish, *Orconectes tricuspis* – Western Highland Crayfish, *Orconectes packardi* – Appalachian Cave Crayfish). The most comprehensive treatments of Kentucky's crayfish fauna includes Rhoades (1944) and Taylor and Schuster (2005).

Modification of habitats, sedimentation, and dams are serious threats to freshwater crayfishes. A larger threat that has not yet impacted Kentucky is the introduction and establishment of non-native crayfishes. Several studies have shown the displacement of native species by more aggressive or opportunistic non-native species (Capelli 1982; Taylor and Redmer 1996; Hill and Lodge 1999). Many introductions are suspected to be from fisherman dumping their purchased live crayfish into the stream at the end of the day.

Nationally, about 48% of crayfish species are of conservation concern (ranging from Vulnerable to Endangered); over a third (37%) of the Kentucky fauna falls into this category (KSNPC, 2010). Within the Commonwealth, much of this is driven by concerns related to very small distributional extents or endemism. For instance, The Crittenden Crayfish (*Orconectes bisectus*) and Livingston Crayfish (*Orconectes margorectus*) are only found in a few streams within a couple of counties in northwestern Kentucky. The recently discovered Cumberland Plateau Cave Crayfish, recently differentiated from other species using genetic data (Buhay and Crandall, 2008), is one of our rarest crayfishes. Its global distribution is underground cave streams within an area of less than 180 square miles in southeastern Kentucky. Currently, no crayfish species are federally-protected in Kentucky although the Louisville Crayfish has been previously reviewed as a candidate for federal listing and more recently, the Blood River Crayfish.

The crayfishes of Kentucky all depend on a connection to groundwater. This facilitates burrowing, a behavior common to all crayfishes. Some species, such as stream dwellers (known as tertiary burrowers), spend only a short time of the year burrowed into the groundwater, an example being drought periods. Other species spend a majority of the year in groundwater burrow systems (primary burrowers), coming out only to breed or forage (Taylor and Schuster 2005). An example of this behavior can be seen by walking through fields in the spring and looking for mud chimneys made by the excavation activity of a crayfish. The Upland Burrowing Crayfish (*Cambarus dubius*), for instance, can be seen doing this at certain times of the year. Secondary burrowers are an intermediate between these two strategies, spending time in the year between streams and burrow systems.

Cave species are particularly at-risk from upland activities that pollute groundwater flowing into cave systems; this includes issues with chemical spills, agricultural runoff, salt from roads, and siltation from poor land use. Best Management Practices are needed to guard against perturbations to groundwater.

### Crayfish Conservation Areas

Species occurrence data was used to determine 8-digit hydrologic units (watersheds) where there were endemic or multiple species of SGCN crayfish. Eleven 8-digit watersheds were identified as Crayfish Conservation Areas ([Appendix 4.35](#)), in alphabetic order: Barren, Bayou De Chien, Kentucky Lake, Little Kentucky, Lower Ohio-bay, Middle Green, South Fork Cumberland, Upper Cumberland, Upper Cumberland-Lake Cumberland, Upper Green, and Upper Levisa.

[Download all 25 new 2013 Crayfish Species Accounts and Statewide Maps \(8 MB\)](#)

### Kentucky's Crayfish of Greatest Conservation Need and their statuses.

Common name	Scientific name	Federal	Heritage	GRank	SRank
<b>Malacostraca (25 species).</b>					
<a href="#">An Amphipod</a> ( <a href="#">Stygobromus vitreus</a> )	<i>Stygobromus vitreus</i>	N	S	G3	S1
<a href="#">Appalachian Cave Crayfish</a>	<i>Orconectes packardi</i>	N	T	G2	S2
<a href="#">Big Sandy Crayfish</a>	<i>Cambarus veteranus</i>	N	S	G3	S1
<a href="#">Big South Fork Crayfish</a>	<i>Cambarus bouchardi</i>	N	E	G2	S2
<a href="#">Blood River Crayfish</a>	<i>Orconectes burri</i>	N	T	G2	S2
<a href="#">Bottlebrush Crayfish</a>	<i>Barbicambarus cornutus</i>	N	S	G3	S2

<a href="#">Bousfield's Amphipod</a>	<i>Gammarus bousfieldi</i>	N	E	G1	S1
<a href="#">Cajun Dwarf Crayfish</a>	<i>Cambarellus shufeldtii</i>	N	S	G5	S2
<a href="#">Clifton Cave Isopod</a>	<i>Caecidotea barri</i>	N	E	G1	S1
<a href="#">Crittenden Crayfish</a>	<i>Orconectes bisectus</i>	N	T	G2	S1
<a href="#">Cumberland Plateau Cave Crayfish</a>	<i>Orconectes barri</i>	N	T	G2	SNR
<a href="#">Ghost Crayfish</a>	<i>Orconectes inermis inermis</i>	N	S	G3	S3
<a href="#">Gray-speckled Crayfish</a>	<i>Orconectes palmeri palmeri</i>	N	E	G5	S1
<a href="#">Hairy Crayfish</a>	<i>Cambarus friaufi</i>	N	S	G4	S3
<a href="#">Livingston Crayfish</a>	<i>Orconectes margorectus</i>	N	T	G2	S2
<a href="#">Longclaw Crayfish</a>	<i>Cambarus buntingi</i>	N	S	G4	N
<a href="#">Louisville Crayfish</a>	<i>Orconectes jeffersoni</i>	N	E	G1	S1
<a href="#">Mammoth Cave Crayfish</a>	<i>Orconectes pellucidus</i>	N	S	G3	S3
<a href="#">Mammoth Cave Shrimp</a>	<i>Palaemonias ganteri</i>	LE	E	G1	S1
<a href="#">Mountain Midget Crayfish</a>	<i>Cambarus parvoculus</i>	N	T	G4	S1
<a href="#">Mud River Crayfish</a>	<i>Orconectes ronaldi</i>	N	T	G3	S3
<a href="#">Ohio Shrimp</a>	<i>Macrobrachium ohione</i>	N	E	G4	S1
<a href="#">Shrimp Crayfish</a>	<i>Orconectes lancifer</i>	N	E	G5	S1
<a href="#">Swamp Dwarf Crayfish</a>	<i>Cambarellus puer</i>	N	E	G4	S1
<a href="#">Vernal Crayfish</a>	<i>Procambarus viaeviridis</i>	N	T	G5	S1

## LITERATURE CITED

- Barr, T.C., Jr. 1968. Ecological studies in the Mammoth Cave systems of Kentucky. I. The biota. *International Journal of Speleology* 3:147-204
- Burr, B.M. and H.H. Hobbs, Jr. 1984. Additions to the crayfish fauna of Kentucky with new locality records for *Cambarellus shufeldtii*. *Transactions Kentucky Academy of Science* 45:14-18.

- Buhay, J.E., and K.A. Crandall. 2008. Taxonomic revision of cave crayfishes in the genus *Orconectes*, subgenus *Orconectes* (Decapoda: Cambaridae) along the Cumberland Plateau, including a description of a new species, *Orconectes barri*. *Journal of Crustacean Biology* 28(1): 57–67.
- Capelli, G.M. 1982. Displacement of northern Wisconsin crayfish by *Orconectes rusticus*. *Limnology and Oceanography* 27: 741-745.
- Cole, G.A. and W.L. Minckley. 1961. A new species of amphipod crustacean from Kentucky. *Transaction American Microscopical Society* 80(4):391-398.
- Crandall, K.A., and J.E. Buhay. 2008. Global diversity of crayfish (Astacidae, Cambaridae, and Parastacidae—Decapoda) in freshwater. *Hydrobiologia* 595(1): 295-301.
- Hobbs, H. H., Jr. 1973. Movement and ecology of troglobitic crayfishes in southern Indiana caves. Pp. 16-17 in National Speleological Society '73 Program. Bloomington, IN.
- Hobbs, H.H., Jr. 1974. A checklist of the North and Middle American crayfishes (Decapoda: Astacidae and Cambaridae). *Smithsonian Contributions to Zoology*. 166:1-161.
- Hobbs, H. H., Jr. 1981. The crayfishes of Georgia. *Smithsonian Contributions to Zoology* 318:1-549.
- Hobbs, H.H. Jr. 1989. An illustrated checklist of the American crayfishes (Decapoda: Astacidae, Cambaridae & Parastacidae). *Smithsonian Contributions to Zoology*, 480: 1-236.
- Hobbs, H.H., Jr. and T.C. Barr, Jr. 1972. Origins and affinities of the troglobitic crayfishes of North America (Decapoda: Astacidae) Genus *Orconectes*. *Smithsonian Contributions to Zoology* 105. 84 pp.

- Hobbs, H.H., Jr. H.H. Hobbs III, and M.A. Daniel. 1977. A review of the troglobitic decapod Crustaceans of the Americas. *Smithsonian Contributions to Zoology*, 244: 1-183.
- Holsinger, J.R. 1976. The freshwater amphipod crustaceans (Gammaridae) of North America. Water pollution control research series 18050 ELD04/72 US Environmental Protection Agency.
- Hill, A. M. and D. M. Lodge. 1999. Replacement of resident crayfishes by an exotic crayfish: the roles of competition and predation. *Ecological Applications* 9(2): 678-690.
- Kentucky State Nature Preserves Commission [KSNPC]. 2010. Biotics database. Frankfort, Kentucky.
- O'Bara, C.J. 1988. Current distribution, habitat requirements and potential threats of the upper Cumberland River Johnny darter *Etheostoma nigrum susanae*. Unpublished report to the U.S. Fish and Wildlife Service, Asheville, North Carolina. 19 pp.
- Page, L.M. 1985. The crayfishes and shrimps (Decapoda) of Illinois. *Illinois Natural History Survey Bulletin* 33(4):335-448.
- Payne, J.F., and J.O. Price. 1983. Studies on the life history and ecology of *Orconectes palmeri palmeri*. Pages 183-191 in Goldman, C.R. (ed), *Freshwater Crayfish V*. AVI Publishing, Westport, CT
- Pearson, William D. and Charles H. Boston. 1995. Distribution and status of the Northern cavefish, *Amblyopsis spelaea*. Final report, Nongame and Endangered Wildlife Program, Indiana Department of Natural Resources, 99 pages.

- Penn, G.H., Jr. 1950. The genus *Cambarellus* in Louisiana (Decapoda: Astacidae). American Midland Naturalist 44:421-426.
- Penn, G.H., Jr. and J.F. Fitzpatrick, Jr. 1963. Interspecific competition between two sympatric species of dwarf crayfishes. Ecology 44:793-797.
- Pflieger, W.L. 1996. The crayfishes of Missouri. Missouri Dept. of Conservation, Jefferson City, Missouri. 152 pp.
- Rhoades, R. 1944. The crayfishes of Kentucky, with notes on variation, distribution, and descriptions of new species and subspecies. American Midland Naturalist 31: 111-149.
- Taylor, C.A. 2000. Systematic studies of the *Orconectes juvenilis* complex (Decapoda: Cambaridae), with descriptions of two new species. Journal of Crustacean Biology, 20(1): 132-152.
- Taylor, C.A. 2002. Taxonomy and conservation of native crayfish stocks. Pp. 236-257 In Holdich, D.M., (ed.) Biology of Freshwater Crayfish. Wiley- Blackwell. New York.
- Taylor, C.A., and M.H. Sabaj. 1998. A new crayfish of the genus *Orconectes* from the Blood River drainage of western Kentucky and Tennessee (Decapoda: Cambaridae). Proceedings of the Biological Society of Washington 111(3):645-652.
- Taylor, C.A., and M. Redmer. 1996. Dispersal of the crayfish *Orconectes rusticus* in Illinois, with notes on species displacement and habitat preference. Journal of Crustacean Biology 16(3): 547-551.
- Taylor, C.A., Schuster, G.A., Cooper, J.E., DiStefano, R.J., Eversole, A.G., Hamr, P., Hobbs III, H.H., Robison, H.W., Skelton, C.E., and R.F. Thoma. 2007. A reassessment of the

conservation status of crayfishes of the United States and Canada after 10+ years of increased awareness. *Fisheries* 32(8): 372-389.

Taylor, C.A., and G.A. Schuster. 2005. The crayfishes of Kentucky. Illinois Natural History Survey Special Publication 28. viii + 219 pp.

Truesdale, F.M. and W.J. Mermilliod. 1979. The river shrimp *Macrobrachium ohione*

(Smith) (Decapoda, Palaemonidae): its abundance, reproduction, and growth in the Atchafalaya River basin of Louisiana, USA. *Crustaceana*. 36:61-73.